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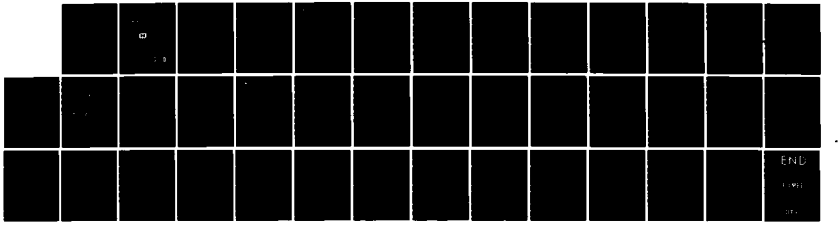
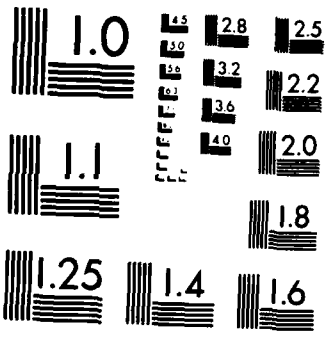
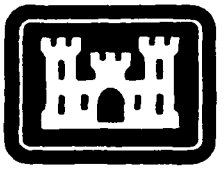




RECONNAISSANCE REPORT
FOR
CAMP BRANCH / LYNCHES LAKE
FLORENCE COUNTY, S. C.



US Army Corps of Engineers
Charleston District

SECTION 205
OF THE
1948 FLOOD CONTROL ACT
AS AMENDED

AUGUST 1983

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A153661	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Camp Branch/Lynches Lake, Lake City, Florence County, South Carolina		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Corps of Engineers Charleston District P. O. Box 919, Charlestor, SC		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Corps of Engineers Office, Chief of Engineers Washington, DC 20314		12. REPORT DATE August 1983
		13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) U. S. Army Corps of Engineers South Atlantic Division 30 Pryor Street, S.W. Atlanta, GA 30303		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for Public Release: Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Prepared in cooperation with the City of Lake City, South Carolina and the U. S. Fish and Wildlife Service

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Flood Control
Environmental Impact

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Reconnaissance report determines the advisability to initiate detail studies. The report recommends approval of further study.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

CAMP BRANCH/LYNCHES LAKE

LAKE CITY, FLORENCE COUNTY, SOUTH CAROLINA

Section 205 Reconnaissance Report

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DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 919
CHARLESTON, S.C. 29402

REPLY TO
ATTENTION OF
SACEN-PS

SUBJECT: Reconnaissance Report, Camp Branch/Lynches Lake, Lake City, Florence County, South Carolina

Commander, South Atlantic Division
ATTN: SADPD-P

AUTHORITY

1. This reconnaissance report was prepared under authority contained in Section 205 of the 1948 Flood Control Act, as amended. Subject report was initiated by letter to SADPD-P dated 3 May 1983, subject: Camp Branch/ Lynches Lake, Lake City, Florence County, South Carolina. It was requested by letter dated 21 April 1983 from the City of Lake City, South Carolina (See Inclosure 1).

SCOPE OF WORK

2. This report was prepared using readily available data, supplemented where necessary with additional field surveys and in-house studies. The purpose of this report is to determine the magnitude of existing water resource problems and the feasibility of further Federal involvement in formulating solutions to these problems. Due to the nature of this report, information contained herewith is considered preliminary and subject to revision should detailed investigation be authorized.

PRIOR REPORTS

3. There are no previous Corps reports available for the study area. A Flood Insurance Study for the City of Lake City, South Carolina, dated 1 December 1980 was prepared by the Federal Insurance Administration of the Federal Emergency Management Agency. Data from that study was used in the preparation of this reconnaissance report.

BASIN AND STUDY AREA DESCRIPTION

4. Location. The Camp Branch/Lynches Lake watershed is located in Florence and Williamsburg Counties, South Carolina, within the Pee Dee River Basin. Camp Branch is one of several headwater streams that confluence in Lake City, South Carolina, to form Lynches Lake. Lynches Lake flows in a generally southeast direction to its confluence with the Lynches River which is a tributary to the Pee Dee River. The study area is located entirely within Florence County and begins within the corporate limits of Lake City, South Carolina. Old U. S. Highway 378 crossing Lynches Lake is the downstream limit of the study area. At this point the total drainage area is 41.8 square miles. The basin area is generally flat with low-lying swamps that are characteristic of the Coastal Province of South Carolina. A map of the study reach is provided as Plate 1.

5. Topography. The maximum elevation within the watershed is approximately 110 feet, NGVD, with a minimum elevation of about 50 feet, NGVD, near the downstream study limit. The general topography of the watershed is nearly flat. Flood plains in the basin have little slope and are characterized by heavily wooded swamp with braided channels.

6. Rainfall and Climate. A U. S. Weather Bureau Station is located at Lake City, South Carolina, within the Lynches Lake Watershed and has recorded rainfall data since September of 1937. The normal annual rainfall is 45.70 inches, and the basin has an average annual temperature of 64.1 degrees Fahrenheit. The greatest rainfall usually occurs during the months of June, July, August, and September.

7. Environmental Consideration. A preliminary assessment of environmental concerns of the study area is attached as Inclosure 2 to this report. A preliminary report from the U. S. Fish and Wildlife Service addressing wildlife habitat value of the area is attached as Inclosure 3.

PROBLEMS UNDER CONSIDERATION

8. Flood Problems. Property damage is caused by the overflow of Camp Branch/Lynches Lake in a reach lying in the northwest portion of Lake City. The flood problems identified in this report are based on information obtained from local officials as to valuations of structures and historical flood damages, mapping with one-foot contour interval of the major damage area, and a field reconnaissance by a Corps study team. Data obtained from local officials included information on the damage sustained during the flood of 17 March 1983. All of the damages reported in this study occur to the properties of the Lake City (low rent) Housing Authority project on Matthews Road.

9. The flooding of residential structures results in the highest damage in the study area. Average annual damage to residential structures, contents, and associated costs is estimated to be $38,600. The 100-year frequency flood will cause damages to approximately 53 residential units. The majority of these structures are comprised of two living units. The value

of the residential structures is estimated to be $3,230,500, with contents valued at $1,615,250. Damage resulting from a 100-year flood event would be about $516,700.

10. Average annual flood damages to the housing authority's office, maintenance, and community services building are estimated at $100. The value of this structure is approximately $150,000 and contents approximately $88,000.

11. No attempt has been made at this time to estimate flood damage to roads, bridges, or for emergency costs, etc.

12. Approximately 54 structures are located within the area of the 100-year frequency flood plain. To develop more precise data will require detailed hydrologic data and additional inventories of flood plain properties.

13. Hydrologic Analysis. The hydrologic analysis for this report was taken from a Flood Insurance Study prepared for the City of Lake City, South Carolina, Florence County, dated 1 December 1980. This report was prepared by Law Engineering Testing Company for the Federal Emergency Management Agency. The hydrologic analysis for this project was based on an administrative report by the U. S. Geological Survey entitled "Estimating the Magnitude of Peak Discharges for Selected Flood Frequencies on Small Streams in South Carolina", dated September 1975. The U. S. G. S. report is a regional approach based on multiple regression analysis. This analysis related peak discharges to drainage area, slope, length, precipitation intensity and soil index. The discharges obtained using the U. S. G. S. procedure were adjusted for urbanization effects where appropriate. The flooding which occurred on 16 April 1983 is estimated at approximately the 100-year flood level and necessitated the evacuation of 43 families from the major damage area. This flood inundated the Matthews Road (S.C. Hwy. 278) crossing of Lynches Lake. Table 1 lists the adopted discharges for the Camp Branch/Lynches Lake study area.

TABLE 1

DISCHARGE-FREQUENCY DATA
CAMP BRANCH/LYNCHES LAKE
Florence County, S.C.

LOCATION	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGES 10-YR (cfs)	50-YR (cfs)	100-YR (cfs)	500-YR (cfs)
Lynches Lake					
Old U.S. Hwy. 378	41.8	1,800	3,150	4,000	6,400
S.C. Hwy. 278 (Matthews Road)	22.8	1,250	2,200	2,850	4,600
Camp Branch					
Above Confluence With Bald Eagle Br.	19.0	1,150	2,000	2,600	4,150

STUDY OBJECTIVES

14. The objectives of this phase of the investigation are to determine the feasibility of further Federal involvement in addressing the flooding problems identified along Camp Branch/Lynches Lake and to develop a detailed study plan. Should further study be needed, the objectives would be to formulate alternative measures to alleviate flood damage and to select the best course of action to alleviate these problems.

PLANNING CONSTRAINTS

15. There are no major planning constraints known at this time. However, it is known that the lower reaches of the study area tend to become more swampy, and stands of cypress trees have been observed in this area. During detailed studies, should an alternative requiring construction in this downstream reach appear to be favorable, certain constraints may have to be abided by in order to preserve downstream resources and habitats.

POTENTIAL SOLUTIONS

16. Several alternative measures to meet the problems and needs of the area are possible; however, some of these measures are not practical or economical. Possible solutions may be divided into two broad categories of structural and nonstructural. Structural measures are designed to modify floods by altering the natural environment. These measures include alternatives which reduce flood elevations, divert floods, change the timing and duration of floods or restrict floods from portions of the flood plain. Nonstructural measures are designed to modify flood damage susceptibility and include modifications to the cultural environment by adjustment in the pattern and mode of land use, by developmental policies and by assistance to affected individuals. Also, a combination of structural and nonstructural measures is possible.

NONSTRUCTURAL MEASURES

17. Nonstructural measures do not attempt to reduce or eliminate flooding but are designed to regulate the use and development of the flood plain, thus lessening damaging effects of large floods. Nonstructural measures consist of subdivision regulations, zoning, building codes, flood proofing, evacuation, open-space development and other measures to remove properties from the flood plain.

STRUCTURAL MEASURES

18. Structural measures are designed to alleviate flood problems by reducing flood stages or by moving damageable flood problems by reducing flood stages. These measures include channel modification, dams and reservoirs, and levee construction.

19. Hydraulic Analysis. The HEC-2 backwater model derived for the Flood Insurance Study was obtained from Law Engineering Testing Company. Existing conditions flood profiles were derived using this model with Manning's "N" values changed to reflect current conditions in the study reach. Improved conditions and channel designs were evaluated using the HEC-2 computer program and guidance presented in appropriate Engineering Manuals and other publications.

20. For improved conditions, two continuous channel design reaches are recommended with a Manning's "N" value of 0.040 for the channel and no change in the overbank areas. Table 2 lists pertinent data relating to each reach.

TABLE 2

CAMP BRANCH/LYNCHES LAKE
CHANNEL DESIGN

ITEM	REACH I	REACH II
Starting Station	215+50	259+10
Ending Station	259+10	296+80
Reach Length (feet)	4360	3770
Side Slope	2.0 to 1	2.0 to 1
Bottom Grade	.00046	.0012
Bottom Width (feet)	50	50
Depth (feet)	2.0	varies

21. The bottom grade for Reach I is the existing natural grade. The grade and varying depth in Reach II will taper the improved channel back to natural ground at station 296+80. Two weirs are also recommended for construction at the starting stations of both channel reaches. These weirs will serve two purposes: (1) to prevent the adjacent wetlands from draining and thus causing adverse environmental impacts on the vegetative cover and

wildlife habitat, and (2) to reduce maintenance costs by inhibiting vegetative growth in the cleared channel.

PROJECT COSTS

22. The total first cost for constructing the above-described plan would be about $237,000. Cost estimates are based on preliminary data and will be modified as more data becomes available. Annual charges, estimated at $22,100, are based on the prevailing Federal interest rate of 7 7/8% and a project life expectancy of 50 years. The $22,100 annual charge includes $3,000 for annual maintenance.

PROJECT BENEFITS

23. Construction of the previously-described project plan would provide direct flood damage reduction benefits along Camp Branch/Lynches Lake in the area adjacent to the channel construction. Damages would be reduced by approximately $25,600 on an average annual basis (See Table 3).

24. Flood damage reduction with the channel modification project analyzed would be afforded to all structures within the 10-year flood plain. First floor inundation would not begin until the 25-year frequency flood is exceeded.

BENEFIT/COST COMPARISON

25. The following tabulation (Table 3) illustrates the benefit/cost comparison of the project evaluated during the reconnaissance investigation. Due to the nature of reconnaissance studies, economic data shown is considered preliminary and subject to change during detailed project studies.

TABLE 3

BENEFIT/COST COMPARISON

Annual Residential Flood Reduction Benefits	$ 25,500
Annual Commercial Flood Reduction Benefits	100
Total Annual Flood Reduction Benefits	$ 25,600
Annual Project Costs	$ 22,100
Benefit-to-Cost Ratio	1.2 to 1

FEDERAL RESPONSIBILITIES

26. Project construction cost for flood control measures implemented through Section 205 of the 1948 Flood Control Act, as amended, are apportioned in accordance with traditional cost allocation procedures. In summary, the Federal government should bear the cost of project construction, excluding all costs allocated to bridge or utility modifications and to the acquisition of project-related lands. In addition, the Federal government would bear the cost of the preliminary feasibility investigations and under existing regulations the detail design documents. under the Administrations proposed cost sharing policy, however, the local sponsor would be required to pay 50% of the detail design studies and a minimum of 35% of construction costs.

NON-FEDERAL RESPONSIBILITIES

27. Section 205 projects are local participation projects and require non-Federal participation for acquisition of project-related lands and for cost allocated to bridge and utility modifications. The following items of local cooperation would be required for implementation of a flood control project on Camp Branch/Lynches Lake in Florence County, South Carolina. Local project sponsors would be required to:

a. Provide without cost to the United States all lands, easements, and rights-of-way, including disposal areas as determined by the Chief of Engineers, necessary for project construction;

b. Accomplish without cost to the United States all alterations and relocation of buildings, transportation facilities, storm drains, utilities, and other structures made necessary by project construction;

c. Hold and save the United States free from damages due to construction, operations, and maintenance of the project, provided damages are not due to the fault or negligence of the United States or its contractors;

d. Maintain and operate the works after completion in accordance with regulations prescribed by the Secretary of Army;

e. Prescribe and enforce regulations to prevent obstructions or encroachments on the channels or other flood control works which would reduce their flood-carrying capacity or hinder maintenance and operation, and control development in the project areas to prevent unwise development;

f. Periodically inform residents of affected areas that channel improvement will not provide complete flood protection.

g. Agree to assume all project costs in excess of the Federal limitation of $4,000,000.

WORK PROGRAM

28. Work items considered necessary in preparing an expanded reconnaissance report on flood problems in Camp Branch/Lynches Lake are summarized below. The refined studies expected in the detailed project study will also be discussed in this summary. A PB-6 which gives a breakdown of cost for the three stages of study preparation is attached as Inclosure 4, which also includes a work item summary and network diagram.

a. Public Coordination. During the expanded reconnaissance close coordination between planning elements, local governmental representatives and local residents will be maintained. Identification of a local sponsor for the DPS and an indication of willingness and ability to contribute 50% of the cost of that phase will also be accomplished in this study stage. A late stage plan formulation meeting will be held to obtain local views on alternative plans of improvement before selection of a recommended plan and finalization of the DPS.

b. Environmental Studies. A detailed inventory of the environmental resources present along the flood plain and project impact areas will be prepared. This information will be used to determine what the impacts of various alternatives will be on the environment of the study area and to evaluate ways to enhance the environment and/or ameliorate the adverse effects that potential alternatives could have. Finalization and report write-up will be prepared in the DPS.

A cultural resources reconnaissance will be made of the study area with primary emphasis along the immediate project impact area. This will serve to identify either known or possible archeological and historical sites within the study area. The study will be done in the expanded reconnaissance report.

c. Fish and Wildlife Studies. In accordance with the agreement between the Corps of Engineers and the United States Fish and Wildlife Service, Department of the Interior (USFWS), the Fish and Wildlife Service will conduct appropriate studies to furnish the required Coordination Act Report.

d. Hydrology and Hydraulic Studies. Hydrology and hydraulic studies will be conducted in sufficient detail in the expanded reconnaissance report to identify flood prone areas and delineate the flood plain. Flood profiles for existing conditions and for various plans of improvement will be developed for the appropriate recurrence interval events and the SPF utilizing computed flows and the HEC-2 backwater computer program. Profiles will extend a sufficient distance downstream to determine project impact in downstream areas, and the need, if any, for mitigation measures. Design details for the selected plan will be completed in the Detailed Project Study at which time the H & H appendix will be finalized.

e. Economic Studies. Economic analysis will include comparison of costs and benefits of alternative plans. Engineering surveys will be con-

ducted to determine the first-floor elevation of the remaining structures located within the flood plain for which this data has not been previously obtained. Field interviews and questionnaires will be used to determine the historical and potential future flood damages. The nature and extent of flood damages will be determined for residential and commercial-public facilities types of properties, roads, and bridges, business inventories, and emergency costs. Real estate studies will be conducted to determine the value of damageable property. Damages will also be estimated for the future "Do Nothing" alternative.

Any reasonable alternative for correcting the flood problem will be analyzed and displayed in order to determine the most desirable plan of action. This will include both nonstructural and structural alternatives.

Economic studies of existing and base-year conditions will be completed in the expanded reconnaissance as will the initial screening of an array of alternatives based on a preliminary appraisal of costs, benefits, and environmental impacts. DPS evaluations will deal with refining assessments of outputs of alternatives remaining or developed beyond the preliminary appraisal.

f. Project Management. The Project Manager will be responsible for overseeing the overall study process and coordinating the efforts of the various study disciplines.

g. Design and Cost Estimates. During the expanded reconnaissance studies design and cost estimates for all alternative plans will be made in sufficient detail to enable the formulation of a best plan of action. In the DPS additional design efforts and refined cost estimates will be made for the selected plan.

h. Surveys. For the expanded reconnaissance study cross sectional surveys will be obtained at each bridge crossing, 50 feet upstream and downstream of each bridge crossing, and every 400 feet between bridges.

i. Foundation and Material Investigations. Jet probings would be obtained at specified intervals to determine type of material to be excavated. These investigations will be done during the DPS stage.

j. Real Estate Studies. Real estate studies will be made by Savannah District. The expanded reconnaissance study will require current estimates of the values of all of the structures in the flood prone area. Refined land costs will be needed in the DPS stage.

k. Project Formulation. Plan formulation in the expanded reconnaissance study will include working with study team members to formulate a reasonable array of viable alternatives and evaluating the impact of these alternatives in order to select the EQ, NED, and recommended plans of improvements. In the DPS stage, this array will be refined and poss bly added to in order to develop the best plan possible to meet Federal and local objectives.

Problems relating to excess debris and sediment are common in low gradient, warmwater streams, particularly in watersheds with excessive upland erosion. The no action alternative is usually unacceptable to affected landowners and the prevailing sociopolitical climate generally favors the implementation of some type of stream modification project. Decision time frames normally do not allow for site-specific, quantitative analyses of debris or structure needs in the affected stream. Therefore, resource agencies and conservation organizations must be capable of developing and willing to support reasonable compromise alternatives within short time frames. While the authors agree that additional research may be useful to improve upon the guidelines (Appendix) and their acceptance by diverse interests, we also believe that effective resource protection, today, requires innovative and intuitive reasoning based on the best currently available scientific information. Fortunately, a substantial body of literature concerning the role of debris and other structure in streams is available to aid in making these difficult resource decisions.

ponded waters from floodplain areas (Appendix). These were patterned after the Wolf River guidelines with the added features of classifying streams into five categories based on degree of blockage and describing specific methodology for work in each classification. Class I represents the worst condition and would require heavy equipment for necessary work. A Class V reach is in good condition and would require no work. Classes II, III, and IV fall in between.

The first step in applying the guidelines is to classify stream segments. A Stream Classification Group was established consisting of agricultural, forestry, engineering, and fish and wildlife professionals. All stream reaches were observed by walking or canoeing and where possible from an airplane. Some difficulties occurred during initial field work because of people with various backgrounds having differing interpretations of some parts of the guidelines. To reach agreements on differences, the group had to keep in mind that the purpose was to eliminate only those obstructions which significantly restricted stream flow or prevented "normal" drainage of the floodplain. Flood relief was not a project objective. Approximately 240 miles of streams were classified at an average rate of 16 miles per day. Of the reaches classified, 7% were Class I, 4% were Class II, 30% were Class III, 0.2% were Class IV, and 58% were Class V. It is noteworthy that application of the guidelines resulted in the elimination of proposed work from 140 miles of streams (Class V reaches), thus preserving natural stream values while saving an estimated 3 to 4 million dollars.

The next step will be the actual renovation work, where necessary, according to the classification and in accordance with the general and specific methodology. While this may seem to be a process of simply following the guidelines, it can become a problem and be a weak link in the procedure. It has been learned by experience that a biologist, an engineer, or a heavy equipment operator may have different value judgments and thus may interpret the guidelines differently. So, if maintaining natural habitat features is a primary objective, a fish and wildlife biologist should supervise closely the stream renovation to prevent excessive work.

In most cases stream problems are indicative of a larger problem--poor land use practices on uplands and riparian lands. Excessive soil erosion is commonly the most serious problem affecting low gradient streams. The authors view the approach presented herein as strictly an interim measure and not a solution in most cases. We strongly support and encourage the implementation of sound land use practices. Only in conjunction with such practices can stream renovation or any other method of stream modification provide a lasting solution to the problem of reduced stream flow capacities.

was removed by a crew of up to 44 men using chain saws, axes and other hand tools. No heavy equipment was used. Debris which caused no problems was not disturbed. Stream flow was improved in the natural channel while protecting as much of the natural ecosystem as possible (East 1977).

SCS's Wolf River project in west Tennessee was the first stream renovation project reported in the literature that involved the use of detailed, written guidelines and site-specific, prescribed treatments for each stream segment. This project also represented a compromise solution reached after the initial plan to intensively clear and snag approximately 53 miles of stream was challenged.

Major stream blockages caused by debris and excessive sedimentation from upland erosion had forced waters onto the floodplain in many areas. Unacceptable damages to agricultural and forest lands resulted. After some initial work, SCS redesigned the project due to controversy associated with the intensive clearing and snagging methods being used. Working with several government agencies and a private organization, SCS adopted guidelines that identifed the renovation method to be used on specific river segments, the debris to be removed from the channel, how and where the debris was to be disposed of, the riparian vegetation to be removed and the side of the stream on which work was to be performed.

A Biology Work Group, with representatives from the agencies and organization, was formed to assure that work conformed to the guidelines. The Wolf River project used hand-labor crews with light equipment where possible and heavy equipment where necessary to renovate the channel (McConnell et al. 1980). Subjective analysis based on observations by experienced fish and wildlife biologists concluded that the habitat remaining in the no-work and light-work reaches continued to be of high quality and that these segments should hasten recolonization of the intensively-worked segments.

A stream renovation project currently being planned is the 425-mile Obion-Forked Deer Basin Authority (state agency) project in west Tennessee. This proposal grew out of controversy over the Basin Authority's intensive clearing and snagging of 185 miles of streams without Sections 10 or 404 dredge and fill permits from the Corps of Engineers. After four years of working without permits, a Federal Court order halted the project; and the Corps, under pressure, agreed to require Section 10/404 Permits and prepare an Environmental Impact Statement.

A special task force created by the Governor of Tennessee developed environmentally sensitive stream renovation and maintenance guidelines for use by the Basin Authority in removing obstructions from the Obion and Forked Deer Rivers and their tributaries and removing abnormally

their habitats. Channelization and intensive clearing and snagging projects are controversial and have caused national debate and numerous legal battles. Well intentioned persons, having different value judgments, have been on both sides of the issues. For several decades opposing sides stood firm, either for or against such projects. Most often only two alternatives were considered: Either (1) channelize or clear and snag streams using traditional methods or (2) leave them in their existing condition. Few searched for realistic alternative solutions.

Within the past decade a reasonable alternative has been developed and applied which provides a compromise solution to stream-related problems in many locations. The alternative is stream renovation. Stream renovation methods vary among different streams and within individual streams depending on the severity of the problems caused by debris or sediment accumulations. Basically the stream renovation process involves site specific analysis of each segment of a stream and a prescription for the least damaging method to correct problems. Prescriptions range from no action on stream segments where flow is normal, to the use of heavy equipment in segments where removal of major blockages is necessary. As with most compromise solutions all factions get some satisfaction but must accept some things they dislike.

After many years and thousands of miles of streams being channelized or intensively cleared and snagged, a major break resulted from a Federal Court case (NRDC, Inc., et al. vs Grant et al.) initiated on November 30, 1971, involving Chicod Creek in eastern North Carolina. The Soil Conservation Service (SCS) planned to channelize 66 miles of Chicod Creek; however, some believed that removal of excessive debris would solve most of the drainage problems. Work was halted for six years before a compromise settlement was reached.

The settlement agreement eliminated some intensive stream work called for in original plans and included specific guidelines describing where and how modifications could be accomplished. Some stream segments would be avoided while others would receive varying degrees of clearing and snagging. Following six years of litigation, work began on Chicod Creek in 1978 and was completed in 1981 (Coffey 1982).

Another innovative project involving renovation of natural stream channels occurred on 80 miles of the St. Joseph and Tiffin rivers in northwestern Ohio. Many trees, killed by Dutch elm disease, had fallen into the rivers causing numerous log jams. Stream current deflected against the banks caused severe erosion. Silt deposits made worse by the excessive debris caused abnormal flooding. Demand mounted for flood relief. Two private citizens, who opposed channelization, designed and implemented a project to correct the major problems. The project began in August, 1975, and was completed in September, 1976. Excessive debris

Throughout time natural debris (vegetation and rocks) has played a vital and diverse role in stream ecosystem dynamics. Many essential habitat elements are provided directly or indirectly by debris. It serves to enhance stream ecosystems making them more productive for aquatic and terrestrial species. The presence of woody debris has been found to contribute significantly to the productivity of the low-gradient, warmwater streams which are the primary focus of this paper. Debris has also caused some problems, depending, in part, on one's point of view. Due to poor riparian and upland land use and silvicultural practices and natural processes, debris often becomes so abundant that it causes, or aids in causing, a significant reduction in channel hydraulic capacities which results in more frequent and prolonged flooding or swamping.

Prior to man's encroachment and development in floodplains, alteration of stream ecosystems, including occasional channel relocation, was a continual natural process. Now, for the most part, man desires to maintain stable stream conditions especially as they relate to channel capacity and location. Few are willing to tolerate clogged streams that severely restrict water flow. In some cases man also desires to increase stream capacity to transport larger quantities of water in locations where flooding damages his property.

Despite one's personal beliefs about the wisdom of channelizing or otherwise altering streams to protect property in floodplains, strong sociopolitical influences are likely to result in the continuation of such projects. Although most biologists would agree that the best long-term solution would be to allow the natural response to occur, attempts to prevent stream alterations where property damages are occuring will most often fail. Rather than attempt to totally prevent stream alterations it seems prudent to devise stream management alternatives which minimize impacts to aquatic and floodplain habitats while providing needed flood relief. In many cases removal of larger concentrations of debris while protecting smaller collections will rectify problems. While the authors prefer and seek nonstructural solutions in most cases, we also recognize that reasonable compromise will often result in the best outcome for stream ecosystems. Lacking a well designed, broadly accepted alternative, the likely result will be more projects which are highly destructive of fish and wildlife resources, riparian habitats, and aesthetic values and are damaging to water quality.

Two methods most often used to improve stream flows are channelization and clearing and snagging. Typically, these methods involve nearly complete removal of instream debris and the clearing of woody vegetation from the riparian zone on one or both sides of the stream. Usually the same treatment is applied uniformly even though stream conditions may vary considerably. Application of these traditional methods results in severe damages to or destruction of aquatic and terrestrial life and

Need for Compromise in Stream Debris Management

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Estimation of study time and funding requirements is approximate at this time due to lack of information on plan alternatives and associated impact areas. Our actual study funding needs may be subject to revision after completion of your reconnaissance study.

We look forward to participation with your study team during planning efforts on the Lake Swamp study.

Sincerely yours,

Diane Duncan

Diane Duncan
Acting Field Supervisor

DD/PB/lm
Enclosure

1978 (P.L. 95-632). Your written request for the list should be directed to the Field Supervisor, Office of Endangered Species, U.S. Fish and Wildlife Service, Plateau Building, Room A-5, 50 South French Broad Avenue, Asheville, North Carolina 28801.

Recommendations

During your reconnaissance study we recommend that you concentrate on development of alternatives that would minimize disturbance of the riverine and palustrine floodplain wetland habitats of Lake Swamp and its tributaries. If it is possible to provide flood protection by construction of a dike system around the subdivision, significant wetland impacts could be avoided.

Alternatively, if clearing and snagging or channelization must be considered, we recommend that great care be taken to develop a plan which would minimize floodplain habitat impacts. Recent work in other areas of the county has shown that a considerable reduction in impacts due to channel conveyance improvement can be achieved through careful planning. As an example refer to the attached article entitled Need for Compromise in Stream Debris Management by McConnell et al (1982). Such a plan provides for use of a combination of techniques including channelization in stream reaches where required, use of selective clearing in some stream reaches, and leaving some reaches intact where a natural channel exists. If a demonstrated public need for flood control exists with regard to the Lake Swamp floodplain, we believe that an opportunity exists to provide reasonable flood protection while minimizing adverse effects on fish and wildlife resources.

Estimated FWCA Study Costs

The Service has identified the following work items and costs as the minimum requirements in order to adequately address fish and wildlife resources in the study area, and to provide a sound basis for our direct participation in project planning:

Work Items	Biologist Days
Field surveys	6
Habitat mapping	3
Literature review	2
Resource use assessment	1
Evaluation of alternatives	4
Coordination	3
Report preparation, planning-aid report	4
Report preparation, FWCA report	6
	29

Cost/Bio Day =	$275
TOTAL FUNDING	$8,000

The riverine system is characterized by braided low gradient channels over unconsolidated substrates lined by a fringe of bald cypress and tupelo. Above Highway 52 the braided channels are shallow, generally less than 3 feet in depth, and 10-20 feet in width. In accordance with the classification scheme proposed by Cowardin, et al (1979), the riverine system may be described as riverine lower perennial unconsolidated bottom (R2UB2/3G). Proceeding downstream the channels become more braided in character and deeper. Below U.S. Highway 378 the main channel widens in places to over 35 feet.

The palustrine forested wetlands within the Lake Swamp floodplain include temporarily flooded and seasonally flooded types above U.S. Highway 378. The seasonally flooded wetland type (PFOIE) occurs adjacent to the braided channels in lower poorly drained areas. Canopy trees include bald cypress and tupelo with lizards tail, arrowheads, and mermaidweed present in varying amounts. The majority of the floodplain wetland area is temporarily flooded (PFOIA). Canopy trees in this type include laurel oak, sweetgum, water oak, tupelo and occasional loblolly pines. The subcanopy layer includes swamp chestnut oak, laurel oak, sweetgum, tupelo, red maple, ironwood, and mulberry. The shrub layer includes leucothoe, sweet bay, red bay, blueberries, smilax, sweet pepperbush, Virginia willow and storax. Herbaceous plants include sedges, netted chain fern, cinnamon fern, and spleenwort.

Upland bordering Lake Swamp is predominantly agricultural outside the corporate limits of Lake City, with a fringe of mixed pine-hardwood forest bordering the floodplain and the smaller tributary streams. The mixed pine-hardwood forest includes mockernut hickory, swamp chestnut oak, red maple, loblolly pine, sassafras, and sweetgum. Lake Swamp presently provides high quality habitat for a variety of fish and wildlife species adapted to riverine and palustrine wetlands.

Fishes likely to be abundant in the riverine system include game species such as largemouth bass, redbreast, and redfin pickerel as well as the bowfin. Habitat values for gamefishes may be expected to increase as the stream channels become wider and deeper downstream from U.S. Highway 52.

Birds such as the wood duck, red-shouldered hawk, American woodcock, barred owl, hairy woodpecker, and green heron are likely to be important avian species present in the swamp.

Mammals such as the raccoon, mink, eastern woodrat, and the grey squirrel are likely to be abundant in the floodplain, as well as the white-tail deer in areas more remote from Lake City. In areas such as rural Florence County where upland is dominated by agriculture, floodplain forests are particularly important habitats for forest game species.

Although our preliminary survey of Lake Swamp did not reveal the presence of endangered or threatened species, we recommend that you officially request a list of endangered or threatened species pursuant to the requirements of Section 7(c) of the Endangered Species Act, Amendments of

United States Department of the Interior
FISH AND WILDLIFE SERVICE
P.O. BOX 12559
217 FORT JOHNSON ROAD
CHARLESTON, SOUTH CAROLINA 29412

June 24, 1983

Lt. Colonel Bernard E. Stalmann
District Engineer
U.S. Army Corps of Engineers
P.O. Box 919
Charleston, South Carolina 29402

Re: Lake City Reconnaissance Study, Florence County, S.C.

Dear Colonel Stalmann:

This report is provided in partial fulfillment of our responsibilities pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Prescott Brownell of this office accompanied your study team on a field reconnaissance to Lake City on May 11, 1983. During the field trip a preliminary survey of fish and wildlife habitats present in the Camp Branch and Lake Swamp floodplains was completed.

It is our understanding that flood damages occur primarily within a subdivision located in the Lynches Lake floodplain just north of the S.C. Highway 278 bridge.

Existing Fish and Wildlife Resources

In the vicinity of Lake City, the Lake Swamp basin includes agricultural lands, urbanized lands, upland forest, and wetlands. Extensively urbanized lands appear to be predominantly outside the floodplain.

Immediately upstream of Lake City several tributary streams including Camp Branch, Bald Eagle Branch, Cypress Branch, Two Mile Branch, and Spring Run Branch, join to form Lake Swamp. At this point above U.S. Highway 52, Lake Swamp is a broad bottomland hardwood floodplain with a braided channel. Habitat types within the Lake Swamp include riverine wetland, palustrine forested wetland, upland mixed pine-hardwood, and agricultural lands.

INCL. 3

SACEN-E 12 July 1983

MEMORANDUM FOR RECORD:

SUBJECT: Preliminary Environmental Assessment of Lake City, South Carolina, Flood Problem Area

1. A field reconnaissance of areas with flood problems in the town of Lake City, Florence County, South Carolina, was conducted on 11 May 1983. Representatives of the Charleston District and the Charleston Area Office, U. S. Fish and Wildlife Service, surveyed the area along Camp Branch in the northwest portion of the town.

2. Flooding is caused by overflow of water from Camp Branch, a tributary of Lynches Lake. Camp Branch is about nine miles long and drains an area of approximately 68 square miles.

3. The area adjacent to the branch is heavily wooded flood plain. Canopy trees vary from a sweet gum (Liquidambar styraciflua) - laural oak (Quercus laurifolia) - loblolly pine (Pinus taeda) mix in the higher evaluations to a cyprus (Taxodium distichum) - tupelo (Nyssa sp.) -green alder (Alnus crispa) mix adjacent to the channel. The flood plain is a palustrine, broad-leaved deciduous forested, non-tidal wetland with a temporarily flooded water regime (USFWS wetland type PFO1A).

4. Preliminary examination of the Camp Branch area revealed a broad flood plain with little topographic relief. The Lynches Lake swamp area, downstream of U.S. Highway 52, is highly braided and has no defined outlet channel during normal flows. Water in this area tends to pond during much of the year.

5. Several alternatives for reducing flooding were discussed by the team members. They included diking, cleaning and snagging, flood proofing, and channelization. The alternative that appears most likely to provide positive benefits is channelization.

6. No archeological, historical, or historical-archetectural resources were identified during this reconnaissance. A literature search and reconnaissance by a professional archeologist will be necessary if a study is approved. The estimated cost of this work is $3,500.

7. If, as a result of this reconnaissance, further study is determined to be feasible, additional ecological analysis, investigations of the effects of alternatives, and preparation of necessary environmental documents for the DPR would require approximately 45 work days (about $14,000).

Joseph E. Paxton

JOSEPH E. PAXTON
Environmentalist
Environmental Resources Branch

INCL. 2

City of Lake City

P.O. BOX 398
LAKE CITY, SOUTH CAROLINA 29560
PHONE 394-5421

April 21, 1983

Lieutent Colonel Bernard Stalman
Corps of Engineers
P O Box 919
Charleston, South Carolina 29402

Dear Colonel:

The City of Lake City South Carolina request assistance for flood control in the Camp Branch/Lynches Lake Portion of the city. Recent flooding n this area has resulted in monetary loses and forced evacuation of local citizens. Assistance is requested through authority contained in Section 205 of the 1948 Flood Control Act, as amended.

Mr David Harris of the Corps of Engineers viewed the flooding problems that we have had in Lake City. Mr Harris has explained to me the requirements of local cooperation.

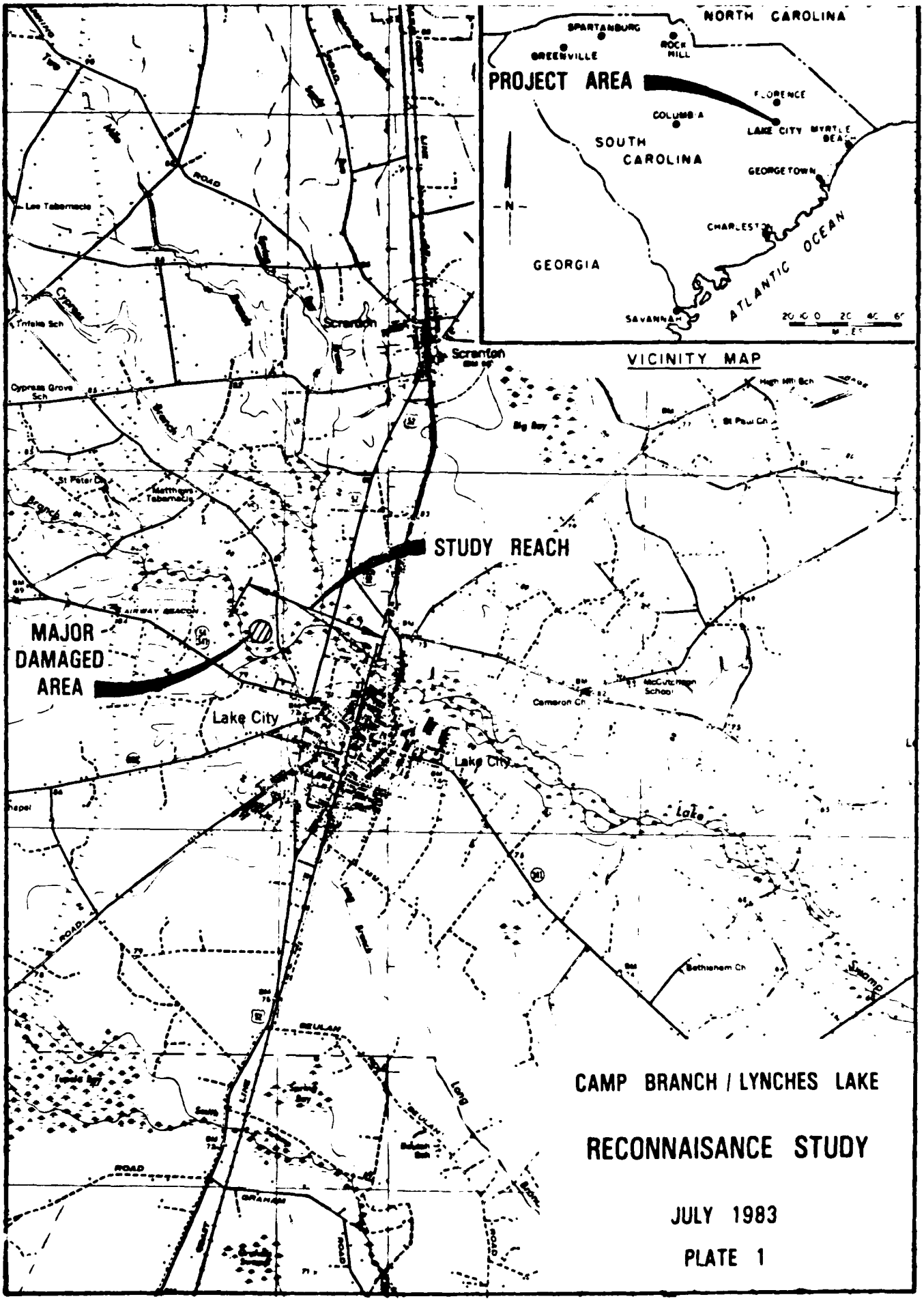
Thank you for your help and cooperation.

Sincerely,

Heyward Robinson
City Administrator

cc: David Harris

TNCL. 1


NORTH CAROLINA
SPARTANBURG
GREENVILLE
ROCK HILL
PROJECT AREA
FLORENCE
COLUMBIA
LAKE CITY
MYRTLE BEACH
SOUTH CAROLINA
GEORGETOWN
N
CHARLESTON
GEORGIA
ATLANTIC OCEAN
SAVANNAH
VICINITY MAP
STUDY REACH
MAJOR DAMAGED AREA
Lake City
Scranton
Lake City
CAMP BRANCH / LYNCHES LAKE
RECONNAISANCE STUDY
JULY 1983
PLATE 1

1. Preparation of Report. The expanded reconnaissance report will be in sufficient detail to lead the reader to an understanding of the various alternatives screened and to show justification for the recommended detailed studies. The DPS report will cover the complete decision process and will contain necessary appendixes to explain in detail the results of the various elements.

CONCLUSIONS

29. Potential alternatives for the flood problems occurring at Lake City are within the scope of the Section 205 program. The estimated costs of completing a detailed investigation of the flood prone area are $114,800 for the expanded reconnaissance report and $54,700 for the Detailed Project Study. Completion of the expanded reconnaissance work will require six to eight months.

RECOMMENDATIONS

30. Based upon information presented in this report, it is recommended that further study of flood problems in Camp Branch/Lynches Lake be authorized. Estimated study cost for completion of an expanded reconnaissance report is $114,800. It is recommended that funds in this amount be allocated to Charleston District as soon as practicable in order that the subject study may be pursued. Costs for preparation of this reconnaissance report were approximately $7,500. Request for reimbursement of these funds will be made by separate correspondence.

F. L. SMITH, JR.
LTC, Corps of Engineers
Commanding

4 Incl
as

1 August 1983

Literature Cited

Coffee, A. 1982. Stream improvement: The Chicod Creek episode. J. Soil and Water Cons. 37(2): 80-82.

East, B. 1977. Make the river do the work. Outdoor Life. 160(4): 78-81, 152.

McConnell, C.A., D.R. Parsons, G.L. Montgomery, and W.L. Gainer. 1980. Stream renovation alternatives: The Wolf River story. J. Soil and Water Cons. 35(1):17-20.

APPENDIX

Stream Renovation and Maintenance Guidelines for the Obion-Forked Deer River System

Preface

The Obion-Forked Deer Basin Authority has been charged with the control and development of water and related land resources in the Obion-Forked Deer River Basin. To achieve this goal, drainage patterns will be re-established and abnormal standing water will be removed from the floodplain. The guidelines below will help the Basin Authority to achieve that goal, while simultaneously conducting the work using the least environmentally damaging methods.

The following guidelines apply only to channel maintenance within existing stream channels. Lateral drainage guidelines are covered separately. The purpose of lateral drainage works will be to attain surface and associated ground water regimes which are conducive to the maintenance and re-establishment of hardwood forests and the improvement of production on existing prime farmlands.

Instream work, will be implemented at specific locations where blockages or snags occur as defined below. It is realized that strong measures will be required on certain reaches of the stream. Other areas will be treated lightly in order to maintain suitable instream habitat. The guidelines contained herein establish work methods for five classes of stream channels as defined below.

DEFINITION OF CLASSES

Class I

- channel deteriorated to the point where normal stream flow* is forced into the floodplain.

Class II

A (Continuous) -

- Some flow exists in the channel.
- Some water staging exists upstream of the obstruction.
- Obstruction generally characterized by a tangle of lodged trees, root wads and other drift material.
- Condition occurring more or less continuously along a reach of the stream.
- Channel generally impassible by small boats at referenced flow.

B (Noncontinuous) -

- Similar to above conditions for Class II-A but characterized

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*All references to flows for all definitions refer to average summer flow.

by separate accumulations of debris with intervening areas generally unobstructed.

Class III

- Obstructions generally consist of large trees and other debris accumulations with occasional blockages spanning entire stream width.
- Slight to no staging of water upstream of obstruction at referenced flow.
- Navigation by small boats generally possible at referenced flow but inconvenient at obstructions.

Class IV

- Isolated reaches possessing unique or sensitive biotic resources. For example, heron rookery upstream of Robert Station Road and Big Cypress Tree Natural Area.

Class V

- Instream structure consists of scattered logs, drift and other debris.
- No staging of water exists at referenced flow.
- Navigation by small boats relatively convenient.

GENERAL METHODOLOGY

The following guidelines address equipment access and the removal and disposal of material. They are generally applicable to all stream classes requiring work except Class I (when work is conducted from both sides of the channel):

A. Log jams - Only those log accumulations that are obstructing flows to a degree that results in significant ponding or sediment deposition should be removed.

B. Other logs

1. Affixed logs - Isolated or single logs will not be disturbed if they are embedded, jammed, rooted or waterlogged in the channel or the floodplain; are not subject to displacement by current; or are not presently blocking flows. Generally, embedded logs that are parallel to the channel are not considered to cause blockage problems and will not be removed. Affixed logs that are crossways to the flow of waters in the channel and are trapping debris to the extent that could result in significant flooding or sedimentation may be removed.

2. Free logs - All logs that are not rooted, embedded, jammed or sufficiently waterlogged to resist movement by river currents may be removed from the channel.

C. Rooted trees - No rooted trees, whether alive or dead, should be cut unless:
   1. They are leaning over the channel at an angle greater than 20^0 off vertical (except cypress or nut bearing trees, which must lean over the channel at an angle greater than 30^0 off vertical), have severely undercut or damaged root systems, or are relying upon adjacent vegetation for support; or
   2. Their removal is required to secure access and provide for practical operation of equipment.

D. Small debris accumulations - Small debris accumulations should be left undisturbed unless they are collected around a log or blockage that should be removed.

E. Material disposal - Disposal of material shall be accomplished by burning, burying or piling provided clearing of wooded areas is not conducted for the purpose of material disposal. If piled, materials shall be placed in a manner to prevent re-entry.

F. Access - Channel excavation and snag removal should be accomplished with the minimum clearing possible to provide access to the stream. Access routes for equipment should be selected to minimize disturbance to existing floodplain vegetation, particularly in the riparian zone.

SPECIFIC METHODOLOGY

Class I

Methods of construction for channel excavation shall employ draglines, large backhoes, and bulldozers. Work shall be accomplished from one side where practical, both sides where necessary. Access shall be obtained in accordance with Section F under General Methodology. Spoil shall be broken at regular intervals (maximum 300' between gaps) and at all natural drains. When work is conducted from one side of the channel, treatment of the opposite bank shall be in accordance with Section C. 1. under General Methodology.

Class II - A

Methods of construction for channel renovation shall employ tracked backhoes and/or D-6 (or equivalent) dozers with winch. Work shall be accomplished from one side of the channel. Selective tree clearing shall be limited to the minimum clearing necessary for equipment access and efficient operation of equipment on the worked side of the channel. Tree removal from the opposite bank shall be in accordance with Section C.1. under General Methodology.

All other work shall be conducted in accordance with Sections, A, B, D, E, and F under General Methodology.

Class II - B

Construction methods are similar to those described for Class II-A above. However, access between specific work sites is to be gained by first considering construction of a work road on the land side of the spoil parallel to the stream. When land side is too wet, access will be on top of the old spoil or berm, whichever is least environmentally damaging. All other work shall be conducted in accordance with Sections A. through F. under General Methodology.

Class III

The maximum size of equipment to be employed shall be a D-6 bulldozer (or equivalent) with winch. A boat and motor will be used when needed for attaching the winch cable to logs. Equipment shall be maneuvered along a path which results in the least amount of damage to existing vegetation. The removal and disposal of material shall be in accordance with Section A. through E. under General Methodology.

Class IV

Special provisions for protecting significant resources will be developed by the field level work group.

Class V

No work shall be conducted.

SUBSEQUENT MAINTENANCE

Cleared work zones will be allowed to revert to woody vegetation upon completion of work in a particular reach.

All other future maintenance work shall be conducted in accordance with the guidance contained herein.

Lateral Drainage and Maintenance Guidelines
for the Obion-Forked Deer River System

Preface

The Obion-Forked Deer Basin Authority (OFDBA) has been charged with the control and development of water and related land resources in the Obion-Forked Deer River Basin. Part of this management sheme will incude an attempt to remcve abnormal standing water from the floodplain. Tne purpose of these lateral drainage works will be to attain surface and associated ground water regimes which are conducive to the maintenance and restablishment of hardwood forests and the improvement of production on existing farmlands; while retaining the maximum feasible flood storage capacity of the floodplain.

Lateral drainage work is contingent upon landowners' participation in the OFDBA timber easement program, whereby the landowner agrees to conserve and protect bottomland hardwood forests in exchange for drainage improvements and maintenance provided by the OFDBA. Certain natural features of the floodplain (e.g., permanent or natural cypress-gum lakes, oxbow lakes, etc.) shall not be drained; however, water "drawdowns" shall be negotiable on a site by site basis by members of the technical work group and the landowner.

I. General Guidelines

A. All lateral openings will be designed on a watershed basis with no reference to property lines.

B. Stream channel maintenance shall proceed by Basin Authority priority, however consideration of lateral drainage shall be given to areas where green timber is currently under stress due to abnormal ground or surface water levels, and where adequate outlets exist. Landowners who participate in the OFDBA timber easement program shall be provided (as time allows) technical assistance by OFDBA, Tennessee Division of Forestry (TDF), and TWRA in applying for and obtaining a Section 404 permit where needed.

C. Lateral channel criteria will be designed to attain surface and associated ground water regimes conducive to re-generation of hardwoods while simultaneously providing for maximum feasible flood storage capacity within that watershed area.

D. Spoil material associated with construction of lateral ditches shall be treated as follows:

1) Spoil shall not be deposited in natural openings or drains.
2) Spoil shall be placed on downstream side.

3) Spoil shall be gapped at regular intervals. Based on local hydraulic, gapped areas shall constitute, as a minimum, 25% of the linear distance of the ditch.

4) Disposal of cleared materials shall be accomplished by burning, burying or piling provided clearing of wooded areas is not conducted for the purpose of material disposal. If piled, materials shall be placed in a manner to prevent re-entry.

E. Water control structures shall be installed and maintained by the OFDBA. Water level manipulations shall be controlled by the private landowner; however, in the following areas structures shall be placed permanently at an elevation that will establish a water level contained within top bank: 1) permanent or natural cypress-gum lakes, 2) old river channels, and 3) natural sloughs.

F. Site specific proposals (by reach) will be developed by a technical work group with final approval by the West Tennessee Natural Resource Task Force.

II. Specific Methodology

A. Methods of construction for lateral drainage shall primarily employ tracked backhoes and bulldozers; however, other methods may be used as required (e.g., dynamite, mats, etc). Work shall be accomplished from one side of the ditch. Only the minimal amount of clearing necessary for equipment access and subsequent maintenance and efficient operation of the equipment shall be accomplished.

B. Lateral drainage measures shall be designed to meet the applicable standards set forth by the National Handbook of Conservation Practice of the USDA-Soil Conservation Service and the USDA SCS National Engineering Field Manual. Measures shall be designed to provide relief from three inches of run-off during a 24 hour period, and draw-down time from retention structure will be a maximum of seven days.

III. Maintenance of Laterial Drainage Works

A. The OFDBA shall be responsible for maintenance of all basin authority water control structures and their constructed ditches, as long as maintenance funding is available. The operation and maintenance procedures shall be addressed during the design of lateral drainage measures and shall include annual inspections to insure functional operation.

B. All beaver control activities will be the responsibility of the landowner, however technical assistance for beaver trapping and control by the OFDBA, TWRA, and TDF shall be intensified.

CAMP BRANCH/LYNCHES LAKE

FLORENCE COUNTY, SOUTH CAROLINA

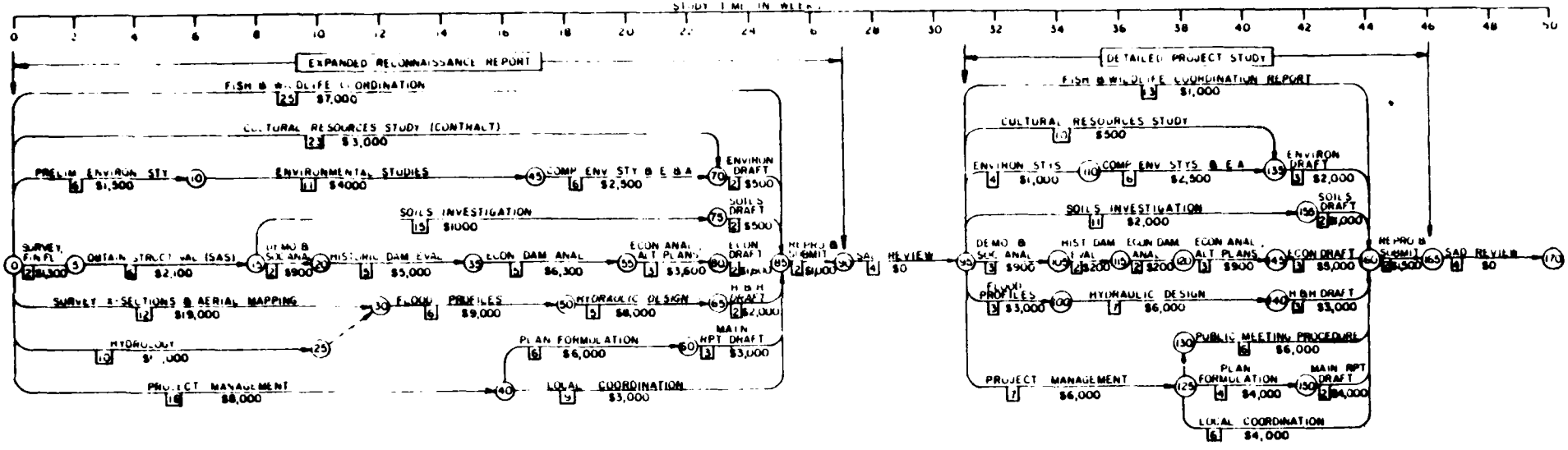
WORK ITEM SUMMARY

Acct. No. 1/	Activity	Cost In Thous. 2/	Code
0-5	Survey, Floor Elevations	1.3	EN-PE
0-10	Prelim. Environmental Assessment	1.5	EN-E
0-25	Hydrology	15.0	EN-FH
0-30	Survey, X-Secs. & Aerial Mapping	19.0	EN-SS
0-40	Project Management	14.0	EN-PS
0-70	Cultural Resources Study (Contr.)	3.5	EN-E
0-85	Fish & Wildlife Coordination	8.0	F.&W.L.
5-15	Obtain Structural Values (Sav. Dist.)	2.1	SAS
10-45	Environmental Studies	5.0	EN-E
15-20	Demographic & Social Analysis	1.8	EN-PE
15-75	Soils Investigations	3.0	EN-GF
20-35	Historic Damages Evaluation	5.2	EN-PE
30-50	Flood Profiles	12.0	EN-FH
35-55	Economic Damages Analysis	6.5	EN-PE
40-60	Plan Formulation	10.0	EN-PS
40-85	Local Coordination	7.0	EN-PS
45-70	Complete Env. Sty. & E. A.	5.0	EN-E
50-65	Hydraulic Design	14.0	EN-FH
55-80	Economic Anal./Alternate Plans	4.5	EN-PE
60-85	Main Report Draft	7.0	EN-PS
65-85	Hydrology & Hydraulics Draft	5.0	EN-FH
70-85	Environmental Draft	2.5	EN-E
75-85	Soils Draft	1.5	EN-GF
80-85	Economics Draft	6.6	EN-PE
85-90	Reproduce & Submit Report	2.5	EN-OS
130-160	Public Meeting	6.0	EN-PS
	TOTAL	169.5	

1/ Activity numbers shown for each activity are those for the Expanded Reconnaissance, except for the public meeting activity which is scheduled for the DPS only (See network diagram).

2/ Costs indicate the total amount for each activity including the Expanded Reconnaissance and DPS costs (See PB-6 for cost breakdown).

Incl. 4



CAMP BRANCH / LYNCHES LAKE
FLORENCE COUNTY
LAKE CITY, SC

RLB:

STUDY COST ESTIMATE (PB-6)
($000)
For use of this form, see ER 11-2-220

APPROPRIATION TITLE: Construction General
CATEGORY: Flood Control Projects
CLASS: Local Protection

NAME OF STUDY: Camp Branch/Lynches Lake
Florence County, South Carolina
SUBCLASS:

LINE NO.	SUBACCOUNT NUMBER	SUBACCOUNT TITLE	CURRENT FEDERAL COST ESTIMATE ACCOUNT Recon	ExpRecon	DPS	TOTAL	PREVIOUS FEDERAL COST ESTIMATE AND DATE APPROVED ( )	REMARKS
	a	b	c	d	e	f	g	h
1		Initial Reconnaissance	7.5			7.5		
2		- DETAILED STUDIES -						
3		Surveys, X-Sec. & Mapping		19.0	-	19.0		
4		Hydrology		15.0	-	15.0		
5		Cultural Resource Invest.		3.0	0.5	3.5		
6		Prelim. Environ. Assessment		1.5	-	1.5		
7		Project Management		8.0	6.0	14.0		
8		F&WLS Coord. Rpt		7.0	1.0	8.0		
9		Demographic & Social Anal.		0.9	0.9	1.8		
10		Flood Profiles		9.0	3.0	12.0		
11		Hydraulic Design		8.0	6.0	14.0		
12		Survey Floor Elevs.		1.3	-	1.3		
13		Environmental Stys		4.0	1.0	5.0		
14		Obtain Struct. Values		2.1	-	2.1		

DATE PREPARED:
DIVISION: South Atlantic
DISTRICT: Charleston
REGION:
BASIN:

ENG FORM 2204 EDITION OF 4 JAN 71 IS OBSOLETE

RCB:

STUDY COST ESTIMATE (PB-6)
($000)
For use of this form, see ER 11-2-220

APPROPRIATION TITLE: Construction General
CATEGORY: Flood Control Projects
CLASS: Local Protection

NAME OF STUDY: Camp Branch/Lynches Lake
Florence County, South Carolina
SUBCLASS:

LINE NO.	SUBACCOUNT NUMBER	SUBACCOUNT TITLE	CURRENT FEDERAL COST ESTIMATE — ACCOUNT Recon	ExpRecon	DPS	TOTAL	PREVIOUS FEDERAL COST ESTIMATE AND DATE APPROVED ( )	REMARKS
	a	b	c	d	e	f	g	h
1		Complete Env. Sty. & E. A.		2.5	2.5	5.0		
2		Historical Damage Eval.		5.0	0.2	5.2		
3		Soils Investigation		1.0	2.0	3.0		
4		H & H Portion of Draft		2.0	3.0	5.0		
5		Local Coordination		3.0	4.0	7.0		
6		Economic Damage Anal.		6.3	0.2	6.5		
7		Plan Formulation		6.0	4.0	10.0		
8		Econ. Anal./Alt. Plans		3.6	0.9	4.5		
9		Environ. Portion of Draft		0.5	2.0	2.5		
10		Soils Portion of Draft		0.5	1.0	1.5		
11		Economic Portion of Draft		1.6	5.0	6.6		
12		Public Meeting		-	6.0	6.0		
13		Main Report Draft		3.0	4.0	7.0		
14		Repro & Submit Rpt		1.0	1.5	2.5		

DATE PREPARED:
DIVISION: South Atlantic
DISTRICT: Charleston
REGION:
BASIN:

ENG FORM 1 APR 77 2204 EDITION OF 4 JAN 71 IS OBSOLETE.

STUDY COST ESTIMATE (PB-6)
($000)
For use of this form, see ER 11-2-220

APPROPRIATION TITLE: Construction General
CATEGORY: Flood Control Projects
CLASS: Local Protection

NAME OF STUDY: Camp Branch/Lynches Lake
Florence County, South Carolina
SUBCLASS:

LINE NO.	SUBACCOUNT NUMBER	SUBACCOUNT TITLE	CURRENT FEDERAL COST ESTIMATE — ACCOUNT: Recon	ExpRecon	DPS	TOTAL	PREVIOUS FEDERAL COST ESTIMATE AND DATE APPROVED ( )	REMARKS
	a	b	c	d	e	f	g	h
1		STUDY TOTALS	7.5	114.8	54.7	177.0		
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

DATE PREPARED:
DIVISION: South Atlantic
DISTRICT: Charleston
REGION:
BASIN:

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END

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6-85

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